**Excel Weighted Time Calculations & Volatility Calculations**

**Weighted time calculations – Annual return calculation based on opening and closing prices of each year:**

Formula:

Annual return for each year = (closing price/opening price)-1.

This showed that overall, the annual return of palladium has the most amount of fluctuations and therefore palladium provides the most opportunity for the highest returns.

On the other hands gold has the least amount of fluctuations and therefore provides the least opportunity for high returns, but also provides the lowest risk.

**Volatility calculations (1990-2023):**

Formulas:

Daily return = (price today/price yesterday) - 1

Volatility = Standard deviation of the daily returns

The volatility calculations showed that over the entire course of the historical data we have, silver and gold had the lowest volatility while palladium and platinum had the highest volatility. generally higher volatility means higher risk as there's a greater chance that the price of an asset moves unexpectedly, which could lead to both larger gains and larger losses.

**Volatility calculations during unstable time periods:**

We wanted to look at the volatility for unstable times. Here we have defined unstable time periods in which there's a massive fluctuation in inflation and other economic indicators - From the power BI inflation graph we can see that this has happened in the following years:

1991-1994,2007-2009, 2010-2012, 2013-2017, 2018-2022

From our volatility analysis we can see that in general gold has a lower volatility and therefore a lower risk during unstable periods. This suggests that gold is the safer of the four however it is still high risk and subject to investor confidence and market conditions in the short term. Out of the four palladium demonstrates the highest opportunity for short term gains however it is also very volatile so associated with the highest risk. This is followed by platinum at second most volatile.